Next, FIG. 4 and FIG. 5 show a third embodiment of the present invention, FIG. 4 is a sectional view for explaining the entire transmission, and FIG. 5 is the schematic view showing the transfer portion. In the third embodiment of the present invention, the torque coupling-type device of the first embodiment is replaced with a wet hydraulic multiple disk clutch in which fastening force is varied in accordance with the movement state of the vehicle. In addition, in the third embodiment, incorporated is an oil pump for applying an operation oil pressure to the hydraulic multiple disk clutch. However, the other structure of the third embodiment is the same as the first embodiment, and the same portions are designated by the same characters and their description is omitted.

That is, the rear end side of an intermediate output shaft **21** is coupled with the front end side of a rear drive shaft **22** through a wet-type hydraulic multiple disk clutch (transfer clutch) **40** as the variable means constituting the main portion of a center differential device. Accordingly, the front engine-front drive (FF) based on the four-wheel drive vehicle is constructed. The transfer clutch **40** controls a duty solenoid provided inside or outside a manual transmission **2**, an oil pressure control device **41** of a control valve by a not-shown control device in accordance with the movement state of the vehicle, and a piston **40***a* is operated.

Besides, between the rear end of an input shaft **8** and the intermediate output shaft **21**, a partition wall **42** for shutting off a space at a side of the input shaft **8** and the space at the side of the intermediate output shaft **21** is formed in a transfer case **5**. By the partition wall **42**, the front end of the intermediate output shaft **21** is rotatably supported through bearings, and a shaft portion of a transfer drive gear **23** is inserted in a hole formed in the partition wall **42**. Further, a pump casing **43***a* of an oil pump **43** for applying the operation oil pressure to the transfer clutch **40** is attached to the partition wall **42** at the side of the input shaft **8** by using the plane of the partition wall **42**. A pump rotating shaft **43***b* extending from the rear end of the input shaft **8** is inserted in the pump casing **43***a* and is coupled with a not-shown inner rotor in the pump casing **43***a*.

The pump casing **43***a* and the pump rotating shaft **43***b* are sealed with an oil seal **44**. The partition wall **42** and the shaft portion of the transfer drive gear **23** are sealed with an oil seal **45**. The counter shaft **10** and the front drive shaft **20** are sealed with an oil seal **46** at the front side of the transfer drive gear **23**. Shutted off is yhe infiltration of oil between the space at the side of the input shaft **8** and the space at the side of the intermediate output shaft **21** is shut off. Incidentally, in FIG. **5**, reference numeral **47** designates a strainer.

By constituting in this way, the same effect as the effect of the first embodiment can be obtained, and it becomes possible to easily change the specification to make fine control in accordance with the movement state of the vehicle by applying the hydraulic multiple disk clutch **40**.

Besides, in general, in the case where a hydraulic control system such as the hydraulic multiple disk clutch **40** is used, the operation oil in which a viscosity change due to a temperature change is slight, such as ATF (Automatic Transmission Fluid), is used. However, the manual transmission has a bevel gear, generally, the hypoid gear, a transmission oil which is excellent for using in extreme pressure performance must be used. Thus, it is necessary that the transfer portion is made a chamber separate from a transmission body. Here, the engine must drive the oil pump as an oil pressure source, and the oil pump **43** uses the oil for the hydraulic control system, such as the ATF, so that sealing becomes complicated.

Thus, as shown in the third embodiment, when sealing with the respective oil seals **44**, **45** and **46** is made by using the partition wall **42**, it becomes possible to easily make 4WD without changing the main transmission side at the side of the input shaft **8**. Besides, when the duty solenoid accompanying with the hydraulic control system, the hydraulic control device **41** of the control valve, and the strainer **47** are effectively arranged in, for example, the space behind the front drive shaft **20**, further the space-saving can be realized.

Note that although the above-mentioned embodiments according to the present invention are separately explained, it is possible for a person skill in the art to combine or utilize a main portion of one of embodiments to the other.

While there has been described in connection with the preferred embodiment of the invention, various changes and modifications may be made therein without departing from the invention, and it is aimed, therefore, to cover in the appended claim all such changes and modifications as fall within the true spirit and scope of the invention.

As described above, according to the invention, there are such excellent effects that the improvement of fuel efficiency caused by the lowering of stirring resistance of the oil can be easily realized and with space saving. In addition, it becomes possible to use a power distribution device of the automatic transmission in common. Further, various existing transfer mechanisms can be easily adopted, and a development time period can be shortened.

What is claimed is:

1. A transmission device of a four-wheel drive vehicle, comprising:

an input shaft connected to an engine for transmitting a driving force;

a hollow counter shaft extended in parallel to said input shaft;

shift gear trains provided between said input shaft and said hollow counter shaft;

a first output shaft disposed in a hollow portion of said counter shaft for transmitting the driving force to a final reduction gear of one of front and rear wheels;

a first drive gear disposed at an end portion of said counter shaft;

a first driven gear engaging with said first drive gear and rotating about a rotating axis of said input shaft;

a second drive gear rotated integrally with the first driven gear about the rotating axis of said input shaft;

a second driven gear disposed at a base end side of the first output shaft and engaging with said second drive gear; and

a second output shaft coupled with said second drive gear through a variable mechanism to transmit the driving force to a final reduction gear of the other one of the front and rear wheels.

2. The transmission device according to claim **1**, wherein said first output shaft transmits the driving force to the final reduction gear of the front wheel, and said second output shaft transmits the driving force to the final reduction gear of the rear wheel.

3. The transmission device according claim **1**, further comprising:

a partition wall for shutting off infiltration of an oil between a first space at a first side having the input shaft and a second space at a second side having the first drive gear.

4. The transmission device according to claim 1, wherein the variable mechanism comprises a viscous-coupling.

5. The transmission device according to claim 1, wherein the variable mechanism comprises a hydraulic multiple disk clutch.

6. The transmission device according to claim 5, further comprising:

an engine-driven oil pump for generating a hydraulic pressure to operate the hydraulic multiple disk clutch.

7. The transmission device according to claim 3, wherein the variable mechanism comprises:

a hydraulic multiple disk clutch; and

an engine-driven oil pump disposed at the partition wall for generating hydraulic pressure to operate the hydraulic multiple disk clutch.

8. A manual transmission device mounted on a four wheel drive vehicle and housed in a transmission case, having an input shaft connected to an engine for transmitting a driving force thereof to either one of final reduction gears via front and rear output shafts, said device comprising:

a hollow counter shaft provided under said input shaft in parallel with thereof for transmitting said driving force;

a shift gear train provided between said input shaft and said hollow counter shaft for changing a relative speed therebetween;

a first output shaft mechanically and rotatably inserted in said hollow counter shaft for transmitting said driving force to either one of said final reduction gears;

a first drive gear fixedly provided at an end portion of said counter shaft;

a first driven gear approximately coaxially provided behind said input shaft for engaging said first drive gear, a rotating axis of said hollow counter shaft being displaced from said input shaft;

a second drive gear integrally formed with said first driven gear;

a second driven gear coaxially provided at a base end portion of said first output shaft for meshing with said second drive gear;

torque transmitting capacity variable means provided at a rear side of said second drive gear for changing a transmitting rate of said driving force between said formal reduction gear and said input shaft; and

a second output shaft coupled with said second drive gear for transmitting said driving force to said final reduction gear so as to effectively improve a fuel consumption economy by decreasing a stirring resistance force of a lubricating oil contained in said transmission case by raising a level of said lubricating oil therein while in operation and to largely shorten a developing period by using common parts of other various kinds of transfer mechanisms.

9. The transmission device according to claim 8, wherein:

said first output shaft transmits said driving force to said front reduction gear.

10. The transmission device according claim 8, comprising:

a transfer case portion integrally formed behind said transmission case and separated by a partition wall therefrom for including said first drive gear.

11. The transmission device according to claim 8, wherein:

said torque transmitting capacity variable means comprises a viscous coupling.

12. The transmission device according to claim 8, wherein:

said torque transmitting capacity variable means comprises a hydraulic multiple disk clutch.

13. The transmission device according to claim 10, further comprising:

an oil pump driven by said engine and mounted on said partition wall for generating a hydraulic pressure to operate said hydraulic multiple disk clutch.

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